General

Guideline Title

International clinical practice guidelines for the treatment of acute uncomplicated cystitis and pyelonephritis in women: a 2010 update by the Infectious Diseases Society of America and the European Society for Microbiology and Infectious Diseases.

Bibliographic Source(s)

Gupta K, Hooton TM, Naber KG, Wullt B, Colgan R, Miller LG, Moran GJ, Nicolle LE, Raz R, Schaeffer AJ, Soper DE, Infectious Diseases Society of America, European Society for Microbiology and Infectious Diseases. International clinical practice guidelines for the treatment of acute uncomplicated cystitis and pyelonephritis in women: a 2010 update by the Infectious Diseases Society of America and the European Society for Microbiology and Infectious Diseases. Clin Infect Dis. 2011 Mar;52(5):e103-20. [61 references] PubMed

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Warren JW, Abrutyn E, Hebel JR, Johnson JR, Schaeffer AJ, Stamm WE. Guidelines for antimicrobial treatment of uncomplicated acute bacterial cystitis and acute pyelonephritis in women. Infectious Diseases Society of America (IDSA). Clin Infect Dis 1999 Oct;29(4):745-58.

Regulatory Alert

FDA Warning/Regulatory Alert

Note from the National Guideline Clearinghouse: This guideline references a drug(s) for which important revised regulatory and/or warning information has been released.

- May 12, 2016 – Fluoroquinolone Antibacterial Drugs : The U.S. Food and Drug Administration (FDA) is advising that the serious side effects associated with fluoroquinolone antibacterial drugs generally outweigh the benefits for patients with sinusitis, bronchitis, and uncomplicated urinary tract infections who have other treatment options. For patients with these conditions, fluoroquinolones should be reserved for those who do not have alternative treatment options.

Recommendations

Major Recommendations

Quality of evidence (I–III) and strength of recommendation (A–C) ratings are defined at the end of the "Major Recommendations" field.

What Is the Optimal Treatment for Acute Uncomplicated Cystitis?

1. Nitrofurantoin monohydrate/macrocrystals (100 mg twice daily for 5 days) is an appropriate choice for therapy due to minimal resistance and propensity for collateral damage (defined as the ecological adverse effects of antimicrobial therapy) and efficacy comparable to 3 days of trimethoprim-sulfamethoxazole (A-I).
2. Trimethoprim-sulfamethoxazole (160/800 mg [1 double-strength tablet] twice-daily for 3 days) is an appropriate choice for therapy, given its efficacy as assessed in numerous clinical trials, if local resistance rates of uropathogens causing acute uncomplicated cystitis do not exceed 20% or if the infecting strain is known to be susceptible (A-I).
    i. The threshold of 20% as the resistance prevalence at which the agent is no longer recommended for empirical treatment of acute cystitis is based on expert opinion derived from clinical, in vitro, and mathematical modeling studies (B-III).
    ii. In some countries and regions, trimethoprim (100 mg twice daily for 3 days) is the preferred agent and is considered equivalent to trimethoprim-sulfamethoxazole on the basis of data presented in the original guideline (A-III) (Warren et al., 1999).
    iii. Data are insufficient to make a recommendation for other cystitis antimicrobials as to what resistance prevalence should be used to preclude their use for empirical treatment of acute cystitis.

3. Fosfomycin trometamol (3 g in a single dose) is an appropriate choice for therapy where it is available due to minimal resistance and propensity for collateral damage, but it appears to have inferior efficacy compared with standard short-course regimens according to data submitted to the US Food and Drug Administration (FDA) and summarized in the Medical Letter (A-I) ("Fosfomycin for urinary tract infections," 1997).
4. Pivmecillinam (400 mg bid for 3–7 days) is an appropriate choice for therapy in regions where it is available (availability limited to some European countries; not licensed and/or available for use in North America), because of minimal resistance and propensity for collateral damage, but it may have inferior efficacy compared with other available therapies (A-I).
5. The fluoroquinolones, ofloxacin, ciprofloxacin, and levofloxacin, are highly efficacious in 3-day regimens (A-I) but have a propensity for collateral damage and should be reserved for important uses other than acute cystitis and thus should be considered alternative antimicrobials for acute cystitis (A-III).
6. Beta-lactam agents, including amoxicillin-clavulanate, cefdinir, cefaclor, and cefpodoxime-proxetil, in 3–7-day regimens are appropriate choices for therapy when other recommended agents cannot be used (B-I). Other beta-lactams, such as cephalexin, are less well studied but may also be appropriate in certain settings (B-III). The beta-lactams generally have inferior efficacy and more adverse effects, compared with other UTI antimicrobials (B-I). For these reasons, beta-lactams other than pivmecillinam should be used with caution for uncomplicated cystitis.
7. Amoxicillin or ampicillin should not be used for empirical treatment given the relatively poor efficacy, as discussed in the 1999 guidelines (Warren et al., 1999) and the very high prevalence of antimicrobial resistance to these agents worldwide (Kahlmeter, "An international survey," 2003; Kahlmeter, "Prevalence and antimicrobial susceptibility," 2003; Naber et al., 2008; Zhanel et al., 2006) (A-III).

What Is the Treatment for Acute Pyelonephritis?

8. In patients suspected of having pyelonephritis, a urine culture and susceptibility test should always be performed, and initial empirical therapy should be tailored appropriately on the basis of the infecting uropathogen (A-III).
9. Oral ciprofloxacin (500 mg twice daily) for 7 days, with or without an initial 400-mg dose of intravenous ciprofloxacin, is an appropriate choice for therapy in patients not requiring hospitalization where the prevalence of resistance of community uropathogens to fluoroquinolones is not known to exceed 10% (A-I). If an initial one-time intravenous agent is used, a long-acting antimicrobial, such as 1 g of ceftriaxone or a consolidated 24-hour dose of an aminoglycoside, could be used in lieu of an intravenous fluoroquinolone (B-III). If the prevalence of fluoroquinolone resistance is thought to exceed 10%, an initial 1-time intravenous dose of a long-acting parenteral antimicrobial, such as 1 g of ceftriaxone (B-III) or a consolidated 24-hour dose of an aminoglycoside, is recommended (B-III).
    i. Data are insufficient to make a recommendation about what fluoroquinolone resistance level requires an alternative agent in conjunction with or to replace a fluoroquinolone for treatment of pyelonephritis.

10. A once-daily oral fluoroquinolone, including ciprofloxacin (1000 mg extended release for 7 days) or levofloxacin (750 mg for 5 days), is an appropriate choice for therapy in patients not requiring hospitalization where the prevalence of resistance of community uropathogens is not known to exceed 10% (B-II). If the prevalence of fluoroquinolone resistance is thought to exceed 10%, an initial intravenous dose of a long-acting parenteral antimicrobial, such as 1 g of ceftriaxone (B-III) or a consolidated 24-hour dose of an aminoglycoside, is recommended (B-III).
11. Oral trimethoprim-sulfamethoxazole (160/800 mg [1 double-strength tablet] twice-daily for 14 days) is an appropriate choice for therapy if the uropathogen is known to be susceptible (A-I). If trimethoprim-sulfamethoxazole is used when the susceptibility is not known, an initial

intravenous dose of a long-acting parenteral antimicrobial, such as 1 g of ceftriaxone (B-II) or a consolidated 24-hour dose of an aminoglycoside, is recommended (B-III).

12. Oral beta-lactam agents are less effective than other available agents for treatment of pyelonephritis (B-III). If an oral beta-lactam agent is used, an initial intravenous dose of a long-acting parenteral antimicrobial, such as 1 g of ceftriaxone (B-II) or a consolidated 24-hour dose of an aminoglycoside, is recommended (B-III).
    i. Data are insufficient to modify the previous guideline recommendation for a duration of therapy of 10–14 days for treatment of pyelonephritis with a beta-lactam agent.

13. Women with pyelonephritis requiring hospitalization should be initially treated with an intravenous antimicrobial regimen, such as a fluoroquinolone; an aminoglycoside, with or without ampicillin; an extended-spectrum cephalosporin or extended-spectrum penicillin, with or without an aminoglycoside; or a carbapenem. The choice between these agents should be based on local resistance data, and the regimen should be tailored on the basis of susceptibility results (B-III).

Definitions:

Strength of Recommendation*

A. Good evidence to support a recommendation for or against use.
B. Moderate evidence to support a recommendation for or against use.
C. Poor evidence to support a recommendation.

Quality of Evidence*

I. Evidence from ≥1 properly randomized, controlled trial.
II. Evidence from ≥1 well-designed clinical trial, without randomization; from cohort or case-controlled analytic studies (preferably from >1 center); from multiple time-series; or from dramatic results from uncontrolled experiments.
III. Evidence from opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees.

*Adapted from Canadian Task Force on the Periodic Health Examination, 1979. Reproduced with the permission of the Minister of Public Works and Government Services Canada.

Clinical Algorithm(s)

An algorithm on the approach to choosing an optimal antimicrobial agent for empirical treatment of acute uncomplicated cystitis is provided in the original guideline document.

Scope

Disease/Condition(s)

- Acute uncomplicated cystitis
- Acute uncomplicated pyelonephritis

Note: The focus of this guideline is management of women with acute uncomplicated cystitis and pyelonephritis who are not pregnant and have no known urological abnormalities or co-morbidities. Management of recurrent cystitis and of urinary tract infection (UTI) in pregnant women, prevention of UTI, and diagnosis of UTI are all important issues that are not addressed in this guideline.

Guideline Category

Management

Treatment

Clinical Specialty

Emergency Medicine

Family Practice

Infectious Diseases

Internal Medicine

Obstetrics and Gynecology

Urology

Intended Users

Advanced Practice Nurses

Physician Assistants

Physicians

Guideline Objective(s)

To provide recommendations for the management of women with acute uncomplicated cystitis and pyelonephritis

Target Population

Women with acute uncomplicated cystitis and pyelonephritis, limited in these guidelines to premenopausal, nonpregnant women with no known urological abnormalities or comorbidities

Interventions and Practices Considered

Acute Uncomplicated Cystitis

1. Nitrofurantoin monohydrate/macrocrystals
2. Trimethoprim-sulfamethoxazole
3. Fosfomycin trometamol
4. Pivmecillinam
5. Fluoroquinolones, ofloxacin, ciprofloxacin, and levofloxacin
6. Beta-lactam agents (amoxicillin-clavulanate, cefdinir, cefaclor, and cefpodoxime-proxetil)

Note: Amoxicillin and ampicillin were considered but not recommended.

Acute Pyelonephritis

1. Urine culture and susceptibility test
2. Oral ciprofloxacin
3. Intravenous (IV) ceftriaxone
4. Aminoglycoside
5. IV fluoroquinolone
6. Oral trimethoprim-sulfamethoxazole
7. Oral beta-lactam agents
8. Hospitalization treatment with an intravenous antimicrobial regimen such as fluoroquinolone; aminoglycoside, with or without ampicillin; extended-spectrum cephalosporin or extended-spectrum penicillin, with or without an aminoglycoside; or a carbapenem

Major Outcomes Considered

- Early (first visit after treatment, typically occurring at 0–7 days after the last dose of the antimicrobial) clinical and microbiological cure
- Late (last visit after treatment, typically occurring 30–45 days after the last dose of the antimicrobial) clinical cure
- Antibiotic efficacy
- Antimicrobial resistance
- Adverse effects of antibiotics

Methodology

Methods Used to Collect/Select the Evidence

Searches of Electronic Databases

Description of Methods Used to Collect/Select the Evidence

For the update, the Expert Panel completed a review and analysis of data published since 1998. Computerized literature searches of the PubMed database were performed. The searches of the English-language literature from 1998 through 2008, using the terms, cystitis or pyelonephritis with MESH terms of "acute uncomplicated UTI," "women," and specific antimicrobials and or classes of antimicrobials. To be included, the study had to be an open-label or randomized, clinical trial of treatment of women with symptoms of acute uncomplicated cystitis or pyelonephritis. At least 1 follow-up visit assessing microbiological or clinical response was required. Studies including >10% men or patients with complicated UTI were excluded. Non–English language studies were excluded because they could not be reliably reviewed by panel members.

Number of Source Documents

The literature search identified 295 potential articles for review, of which 28 met criteria for inclusion in the analyses.

Methods Used to Assess the Quality and Strength of the Evidence

Weighting According to a Rating Scheme (Scheme Given)

Rating Scheme for the Strength of the Evidence

Quality of Evidence*

I. Evidence from ≥1 properly randomized, controlled trial.
II. Evidence from ≥1 well-designed clinical trial, without randomization; from cohort or case-controlled analytic studies (preferably from >1 center); from multiple time-series; or from dramatic results from uncontrolled experiments.
III. Evidence from opinions of respected authorities, based on clinical experience, descriptive studies, or reports of expert committees.

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Methods Used to Analyze the Evidence

Meta-Analysis

Systematic Review with Evidence Tables

Description of the Methods Used to Analyze the Evidence

The process for evaluating the evidence was based on the *Infectious Diseases Society of America (IDSA) Handbook on Clinical Practice Guideline Development* and involved a systematic weighting of the quality of the evidence and the grade of recommendation (see the "Rating Scheme for the Strength of the Evidence" and the "Rating Scheme for the Strength of the Recommendations" fields). This scale had been modified from the one used in the 1999 guideline.

The evaluation of evidence for each antimicrobial class used in treatment of cystitis and pyelonephritis was performed by 2 members of the panel. Each member was assigned at least one antimicrobial class to review. These two reviewers compared their results and reached consensus on their findings for the antimicrobial class and then presented them to the panel. Discrepancies were discussed by the panel and final adjudication was based on review by the chairperson and majority vote.

Methods Used to Formulate the Recommendations

Expert Consensus

Description of Methods Used to Formulate the Recommendations

The Infectious Diseases Society of America (IDSA) Standards and Practice Guidelines Committee (SPGC) in collaboration with European Society for Microbiology and Infectious Diseases (ESCMID) convened experts in the management of patients with cystitis and pyelonephritis. A specific effort was made to include representatives from diverse geographic areas and a wide breadth of specialties, including urology, obstetrics and gynecology, emergency medicine, family medicine, internal medicine, and infectious diseases, with a goal of improving the generalizability and acceptance of the recommendations and subsequent incorporation into clinical practice.

The Panel met on 7 occasions via teleconference and once in person to complete the work of the guideline. The purpose of the teleconferences was to discuss the questions to be addressed, make writing assignments and discuss recommendations. Most of the work was done with e-mail correspondence. All members of the panel participated in the preparation and review of the draft guideline.

Rating Scheme for the Strength of the Recommendations

Strength of Recommendation*

A. Good evidence to support a recommendation for or against use.
B. Moderate evidence to support a recommendation for or against use.
C. Poor evidence to support a recommendation.

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Cost Analysis

A formal cost analysis was not performed and published cost analyses were not reviewed.

Method of Guideline Validation

External Peer Review

Internal Peer Review

Description of Method of Guideline Validation

Feedback from external peer reviews was obtained. All collaborating organizations were also asked to provide feedback and endorse the guidelines. The guideline was reviewed and approved by the Infectious Diseases Society of America Standards and Practice Guidelines Committee (IDSA SPGC), the IDSA Board of Directors, and the European Society for Microbiology and Infectious Diseases (ESCMID) Board prior to

dissemination.

Evidence Supporting the Recommendations

References Supporting the Recommendations

Fosfomycin for urinary tract infections. Med Lett Drugs Ther. 1997 Jul 18;39(1005):66-8. PubMed

Kahlmeter G. An international survey of the antimicrobial susceptibility of pathogens from uncomplicated urinary tract infections: the ECO.SENS Project. J Antimicrob Chemother. 2003 Jan;51(1):69-76. PubMed

Kahlmeter G. Prevalence and antimicrobial susceptibility of pathogens in uncomplicated cystitis in Europe. The ECO.SENS study. Int J Antimicrob Agents. 2003 Oct;22 Suppl 2:49-52. PubMed

Naber KG, Schito G, Botto H, Palou J, Mazzei T. Surveillance study in Europe and Brazil on clinical aspects and Antimicrobial Resistance Epidemiology in Females with Cystitis (ARESC): implications for empiric therapy. Eur Urol. 2008 Nov;54(5):1164-75. PubMed

Warren JW, Abrutyn E, Hebel JR, Johnson JR, Schaeffer AJ, Stamm WE. Guidelines for antimicrobial treatment of uncomplicated acute bacterial cystitis and acute pyelonephritis in women. Infectious Diseases Society of America (IDSA). Clin Infect Dis. 1999 Oct;29(4):745-58. PubMed

Zhanel GG, Hisanaga TL, Laing NM, DeCorby MR, Nichol KA, Weshnoweski B, Johnson J, Noreddin A, Low DE, Karlowsky JA, for the NAUTICA Group, Hoban DJ. Antibiotic resistance in Escherichia coli outpatient urinary isolates: final results from the North American Urinary Tract Infection Collaborative Alliance (NAUTICA). Int J Antimicrob Agents. 2006 Jun;27(6):468-75. PubMed

Type of Evidence Supporting the Recommendations

The types of studies included randomized clinical trials and open label clinical trials. Expert reviews were also incorporated into the final grade recommendation.

The type of supporting evidence is identified and graded for each recommendation (see "Major Recommendations").

Benefits/Harms of Implementing the Guideline Recommendations

Potential Benefits

Optimal treatment of acute uncomplicated cystitis and pyelonephritis, with consideration of antimicrobial resistance and collateral damage

Potential Harms

- Collateral damage, a term describing ecological adverse effects of antimicrobial therapy, such as the selection of drug-resistant organisms and colonization or infection with multidrug-resistant organisms, has been associated with use of broad spectrum cephalosporins and fluoroquinolones.
- The beta-lactams generally have inferior efficacy and more adverse effects, compared with other urinary tract infection (UTI) antimicrobials. For these reasons, beta-lactams other than pivmecillinam should be used with caution for uncomplicated cystitis.

- Side effects of trimethoprim-sulfamethoxazole, nitrofurantoin, fosfomycin trometamol, pivmecillinam, and fluoroquinolones have also been reported.

Qualifying Statements

Qualifying Statements

- It is important to realize that guidelines cannot always account for individual variation among patients. They are not intended to supplant physician judgment with respect to particular patients or special clinical situations. The Infectious Diseases Society of America (IDSA) considers adherence to these guidelines to be voluntary, with the ultimate determination regarding their application to be made by the physician in the light of each patient's individual circumstances.
- There were a limited number of publications directly comparing the same drug given for different durations of therapy. Thus, there was insufficient new literature to support further analyses of single-dose or 3-day therapy versus longer therapy included in the previous guideline. The criteria used to define clinical and microbiological cure and the duration of follow-up and timing of follow-up visits were not uniform across studies. Many studies did not perform or report intent to treat analyses; this may inflate the late clinical and microbiological success rates. Major differences in definitions of study outcomes are highlighted in the text.

Implementation of the Guideline

Description of Implementation Strategy

An implementation strategy was not provided.

Implementation Tools

Audit Criteria/Indicators

Mobile Device Resources

For information about availability, see the *Availability of Companion Documents* and *Patient Resources* fields below.

Institute of Medicine (IOM) National Healthcare Quality Report Categories

IOM Care Need

Getting Better

IOM Domain

Effectiveness

Identifying Information and Availability

Bibliographic Source(s)

Gupta K, Hooton TM, Naber KG, Wullt B, Colgan R, Miller LG, Moran GJ, Nicolle LE, Raz R, Schaeffer AJ, Soper DE, Infectious Diseases Society of America, European Society for Microbiology and Infectious Diseases. International clinical practice guidelines for the treatment of acute uncomplicated cystitis and pyelonephritis in women: a 2010 update by the Infectious Diseases Society of America and the European Society for Microbiology and Infectious Diseases. Clin Infect Dis. 2011 Mar;52(5):e103-20. [61 references] PubMed

Adaptation

Not applicable: The guideline was not adapted from another source.

Date Released

1999 Oct (revised 2011 Mar)

Guideline Developer(s)

European Society of Clinical Microbiology and Infectious Diseases - Medical Specialty Society

Infectious Diseases Society of America - Medical Specialty Society

Source(s) of Funding

Infectious Diseases Society of America (IDSA)

Guideline Committee

Expert Panel

Composition of Group That Authored the Guideline

Panel Members: Kalpana Gupta, Department of Medicine, Veterans Affairs Boston Health Care System and Boston University School of Medicine, Boston, Massachusetts; Thomas M. Hooton, Department of Medicine, University of Miami Miller School of Medicine, University of Miami, Miami, Florida; Kurt G. Naber, Technical University of Munich, Munich, Germany; Bjorn Wullt, Lund University Hospital, Lund, Sweden; Richard Colgan, Department of Family and Community Medicine, University of Maryland, Baltimore, Maryland; Loren G. Miller, Division of Infectious Diseases, Harbor-UCLA Medical Center, Torrance; Gregory J. Moran, Department of Emergency Medicine and Division of Infectious Diseases Olive View-UCLA Medical Center, Slymar, California; Lindsay E. Nicolle, Department of Internal Medicine and Department of Medical Microbiology, University of Manitoba, Winnipeg, Canada; Raul Raz, Infectious Diseases Unit, Ha'Emek Medical Center, Afula, and Rappaport Faculty of Medicine, Technion, Haifa, Israel; Anthony J. Schaeffer, Department of Urology, Northwestern University, Chicago, Illinois; and David E. Soper, Departments of Obstetrics and Gynecology and Medicine, Medical University of South Carolina, Charleston, South Carolina

Financial Disclosures/Conflicts of Interest

All members of the Expert Panel complied with the Infectious Diseases Society of America (IDSA) policy on conflicts of interest, which requires disclosure of any financial or other interest that might be construed as constituting an actual, potential, or apparent conflict. Members of the Expert Panel were provided IDSA's conflict of interest disclosure statement and were asked to identify ties to companies developing products that might be affected by promulgation of the guideline. Information was requested regarding employment, consultancies, stock ownership, honoraria, research funding, expert testimony, and membership on company advisory committees. The panel made decisions on a case-by-case basis as to whether an individual's role should be limited as a result of a conflict.

Potential Conflicts of Interest: K.G. (Chair) has served as a consultant to Pfizer and Pinnacle Pharmaceutical. A.J.S. has served as a consultant to Novabay Pharmaceuticals, Pfizer, Propagate Pharmaceuticals, Hagen/Sinclair Research Recruiting, Swiss Precision Diagnostics Development

Company, and FlashPointMedica; has received honoraria from BMJ Group (British Medical Journal) and Advanstar Communications; received a royalty payment from UpToDate; and received remuneration from the American Urological Association. G.J.M. has served as a consultant to Cerexa, Cubist, Eisai, Forest, Merck, Ortho-McNeil, Pfizer, and Schering- Plough and has received honoraria from Cubist and Merck. K.G.N. has received remuneration as consultant or speaker from Bionorica, Daiich Sankyo, Janssen Cilag, Johnson & Johnson, OM Pharma, Pierre Fabre, Sanofi Aventis, and Zambon and has received research grants from Mer-Lion Pharmaceuticals, Rosen Pharma, and OM Pharma. L.E.N. has served as a consultant to Pfizer, Leo Pharmaceuticals, Cerexa, and Johnson & Johnson and served on the advisory board for Leo Pharmaceuticals and Cerexa. L.G.M. has served as a consultant to Forest and Theravance Laboratories and received research grants from Cubist and Pfizer Pharmaceuticals. T.M.H. has served as a consultant to Pfizer, Alita Pharmaceuticals, and Pinnacle Pharmaceuticals. All other authors: no conflicts.

Guideline Endorser(s)

American Congress of Obstetricians and Gynecologists - Medical Specialty Society

American Urological Association Education and Research, Inc. - Medical Specialty Society

Association of Medical Microbiology and Infectious Disease Canada - Medical Specialty Society

Society for Academic Emergency Medicine - Medical Specialty Society

Guideline Status

This is the current release of the guideline.

This guideline updates a previous version: Warren JW, Abrutyn E, Hebel JR, Johnson JR, Schaeffer AJ, Stamm WE. Guidelines for antimicrobial treatment of uncomplicated acute bacterial cystitis and acute pyelonephritis in women. Infectious Diseases Society of America (IDSA). Clin Infect Dis 1999 Oct;29(4):745-58.

Guideline Availability

Electronic copies: Available in Portable Document Format (PDF) from the Infectious Diseases Society of America (IDSA) Web site .

Print copies: Available from Kalpana Gupta, MD, VA Boston HCS, 1400 VFW Pkwy, 111 Med, West Roxbury, MA 02132 (kalpana.gupta@va.gov).

Availability of Companion Documents

The following is available:

- A version of the guideline for mobile devices is available from the Infectious Diseases Society of America (IDSA) Web site .

In addition, performance measures are available in the original guideline document .

Patient Resources

None available

NGC Status

This summary was completed by ECRI on May 1, 2001. The information was verified by the guideline developer on June 29, 2001. This NGC summary was updated by ECRI Institute on April 1, 2011. The updated information was verified by the guideline developer on May 11, 2011.

This summary was updated by ECRI Institute on October 25, 2013 following the U.S. Food and Drug Administration advisory on Fluoroquinolone Antibacterial Drugs. This summary was updated by ECRI Institute on May 18, 2016 following the U.S. Food and Drug Administration advisory on Fluoroquinolone Antibacterial Drugs.

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